

# North Coast Hydrologic Region

The wettest corner of the state

## **Abundant rain drenches diverse landscape**

It rains hard in the northwestern corner of the state. The rainfall that each year flushes the ranges of the North Coast Hydrologic Region makes it the most water-abundant area of California. The average annual runoff is about 29 million acre-feet or about 41 percent of the state's total natural runoff. That is enough water to fill the state's largest reservoir, Shasta Lake, nearly six times.

The North Coast Region encompasses redwood forests, inland mountain valleys, and the arid Modoc Plateau. It covers 20,000 square miles, or more than 12 percent of the state. Most of the region is mountainous and rugged. It is home to the California Coast Ranges and the Klamath Mountains. The mountain crests, which form the eastern boundary of the region, are about 6,000 feet elevation with a few peaks higher than 8,000 feet. Only 13 percent of the land is valley or mesa, and more than half of that is in the higher northeastern part of the region in the upper Klamath River Basin.

The region extends from Tomales Bay to the Oregon border -- about 400 miles along the Pacific -- then east along the border to just east of Goose Lake.

Annual average precipitation in the region is 53 inches, ranging from more 100 inches in eastern Del Norte County to less than 15 inches in the Lost River drainage area of Modoc County. There is relatively little snow, and it stays on the ground only a short time at 4,000 feet and higher.

## **Forests abound, but little irrigated acreage**

Forests and rangeland covers about 98 percent of the region. Much of it is in national forests, state and national parks, and land under the jurisdiction of the Bureau of Land Management and in Indian reservations. The rest is private forest, often held in large parcels.

About 264,500 acres, or 2.1 percent of the region, is irrigated. Of that, 225,900 acres are in the Upper Klamath River Basin, above the confluence of the Scott and Klamath rivers. In the Upper Klamath area, the main irrigated crops are pasture and alfalfa, grain, and potatoes. Orchards and vineyards are in the Russian River drainage area. Pasture, alfalfa and grain predominate in other irrigated areas.

The major land uses are for timber production, agriculture, fish and wildlife propagation and urban development, mainly near Santa Rosa and Eureka.

Historical timber over-cutting accompanied by environmental constraints have depressed the timber industry. Land use issues in the region include soil erosion caused by such things as road construction, logging, gravel mining, and clear-cutting of timber.

**Region is largest water exporter in state**

Water from the largest reservoirs in the region, the Central Valley Project's Clair Engle Lake and the U.S. Corps of Engineers' Lake Sonoma near Geyserville, send water to other parts of the state. More than 40 percent of the state's water that falls as rain and snow and flows down streams and rivers starts in the North Coast Region. Come summer, however, there is not much rain and the streams and rivers shrink. The region's few, small dams don't hold back enough winter rain and by the dry summer's end the North Coast's water has flowed to the Pacific.

The larger water supply projects of the region include U.S. Bureau of Reclamation's Klamath Project, the Army Corps of Engineers' Russian River Project, the Humboldt Bay Municipal Water District's Ruth Reservoir, and the Eureka-to-McKinleyville distribution system.

The projects below supply most of the water used within the North Coast Region but there are many smaller local water developments. They include large systems serving Yreka, Weaverville, Hayfork, Willits and Fort Bragg. Smaller systems that usually use groundwater serve Mendocino, Garberville and Shelter Cove. Communities continue to improve their water systems. For example, Weaverville Community Services District, which gets its water from Weaver Creek, plans to build a 5-mile pipeline to the Trinity River. Environmental concerns of the U.S. Fish and Wildlife prevented the district from building a second reservoir on West Weaver Creek.

**Water quality of streams, rivers, reservoirs and lakes**

The federal Clean Water Act, Section 303(d), requires that states list water bodies where there are water quality issues. The state Regional Water Quality Control Board, North Coast Region, submitted a list to the SWRCB for adoption. On Feb. 4, 2003, the SWRCB adopted the following list:

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**A list of water quality 303(d) issues**

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- Albion River, 77 miles: Impaired by sedimentation and siltation; potential sources include silviculture, logging road construction and maintenance, and nonpoint sources.
- Americano Creek, 38 miles: Impaired by nutrients; potential sources include pasture grazing, range grazing, intensive animal feeding operations, manure lagoons, and dairies.
- Big River, 225 miles: Impaired by sedimentation and siltation; potential sources include silviculture, logging road construction and maintenance, road construction, disturbed sites from land development, nonpoint sources. The 225 miles of river are also impaired due to temperature; potential sources include habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, erosion and siltation, and nonpoint sources.
- Lower Eel River, 426 miles: Impaired by sedimentation and siltation; potential sources include range grazing, silviculture, and nonpoint sources. This section of the river is also impaired for temperature; potential sources include removal of riparian vegetation and nonpoint sources.
- Eel River, Middle Fork, 1,071 miles: Impaired by sedimentation and siltation; potential sources include erosion and siltation. This reach is also impaired for temperature; potential sources include removal of riparian vegetation and nonpoint sources.
- Eel River, Middle Main Fork, 674 miles: Impaired sedimentation and siltation; potential sources include range grazing, silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, construction and development, land development, hydromodification, habitat modification, removal of riparian vegetation,

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- streambank modification and destabilization, and erosion and siltation. This same reach is also impaired for temperature; potential sources include upstream impoundment, habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, channel erosion, and erosion and siltation.
- Eel River, North Fork, 382 miles: Impaired by sedimentation and siltation; potential sources include silviculture, logging road construction and maintenance, erosion and siltation, and nonpoint sources. This river reach is also impaired for temperature; potential sources include habitat modification, removal of riparian vegetation, streambank modification and destabilization, and nonpoint sources.
  - Eel River, South Fork, 943 miles: are impaired by sedimentation and siltation; potential sources include range grazing, silviculture, logging road construction and maintenance, resource extraction, hydromodification, flow regulation and modification, removal of riparian vegetation, erosion and siltation, and nonpoint sources. The river reach is also impaired by temperature; potential sources include hydromodification, flow regulation and modification, removal of riparian vegetation, erosion and siltation, and nonpoint sources.
  - Eel River, Upper, 1,141 miles: Impaired by sedimentation and siltation; potential sources include agriculture (grazing), silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, silvicultural point sources, construction and development, highway, road, and bridge construction, removal of riparian vegetation, streambank modification and destabilization, and erosion and siltation. In addition, temperature also impairs this reach of the river; potential sources include channelization, habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, and nonpoint sources.
  - Elk River, 88 miles: Impaired by sedimentation and siltation; potential sources include silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, removal of riparian vegetation, streambank modification and destabilization, erosion and siltation, natural sources, and nonpoint sources.
  - Estero Americano, 199 acres: Impaired by nutrients; potential sources include pasture grazing and manure lagoons. Sedimentation and siltation also cause impairment; potential sources include range grazing, hydromodification, removal of riparian vegetation, streambank modification and destabilization. Erosion and siltation, and nonpoint sources.
  - Freshwater Creek, 84 miles: Impaired by sedimentation and siltation; potential sources include silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, removal of riparian vegetation, streambank modification and destabilization, erosion and siltation, natural sources, and nonpoint sources.
  - Garcia River, 154 miles: Impaired by temperature; potential sources include habitat modification, removal of riparian vegetation, streambank modification and destabilization, and nonpoint sources.
  - Gualala River, 455 miles: Impaired by sedimentation and siltation; potential sources include specialty crop production, silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, highway, road, and bridge construction, land development. Erosion and siltation, and nonpoint sources. In addition, this reach is impaired by temperature; potential sources include removal of riparian vegetation, streambank modification and destabilization, channel erosion, erosion and siltation, and nonpoint sources.
  - Jacoby Creek, 19 miles: Impaired by sediment; potential sources include silviculture, road construction, land development, urban runoff, storm sewers, hydromodification. Channelization. Removal of riparian vegetation. Streambank modification and destabilization, drainage and filling of wetlands, channel erosion, erosion and siltation, sediment resuspension, natural sources, and nonpoint sources.
  - Klamath River (Butte Valley), 265 miles: Impaired by nutrients and temperature; potential sources are nonpoint sources.
  - Klamath River (Lost River, Clear Lake, Boles Creek), 601 miles: Impaired by nutrients; potential sources include hydromodification and nonpoint sources. These areas are also impaired by temperature; potential sources include hydromodification, dam construction, upstream impoundment, flow regulation and modification, water diversions, agricultural water diversion, and nonpoint sources.
  - Klamath River (Lost River, Tule Lake and Mt Dome), 612 miles: Impaired by nutrients; potential sources include agriculture, specialty crop production, agriculture subsurface drainage, irrigation tailwater, and return flows, water diversions, agricultural water diversion, habitat modification, removal of riparian vegetation, drainage and filling of wetlands, natural sources, and nonpoint sources. This area is also impaired by temperature; potential sources include hydromodification, channelization, flow regulation and modification, water

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diversions, agricultural water diversion, habitat modification, removal of riparian vegetation, drainage and filling of wetlands, and nonpoint sources.

- Klamath River (Lower Klamath River, Klamath Glen), 609 miles: Impaired by nutrients; potential sources include industrial point sources, industrial point sources, municipal point sources, weather discharge, agriculture irrigated crop production, specialty crop production, pasture and range grazing, intensive animal feeding operations, and agriculture storm runoff, subsurface drainage, and irrigation tailwater. This area is also impaired by organic enrichment and low dissolved oxygen; potential sources include industrial and municipal point sources, agriculture irrigated crop production, specialty crop production, range grazing, agriculture storm runoff, subsurface drainage, and irrigation tailwater, agriculture animal production, upstream impoundment, flow regulation and modification, and out-of-state sources. Potential sources of temperature impairment include hydromodification, dam construction, upstream impoundment, flow regulation and modification, water diversions, habitat modification, removal of riparian vegetation, and channel erosion.
- Klamath River (Middle Klamath River, Iron Gate Dam to Scott River), 548 miles: Impaired by nutrients; potential sources include out-of-state sources and nonpoint and point sources. This stream reach is also impaired by organic enrichment and low dissolved oxygen; potential sources include out-of-state sources and nonpoint and point sources. Temperature impairment in this reach is potentially caused by hydromodification, upstream impoundment, flow regulation and modification, habitat modification, removal of riparian vegetation, and nonpoint sources.
- Klamath River (Upper Klamath River, Oregon to Iron Gate), 129 miles: Impaired by nutrients; potential sources include industrial and municipal point sources, agriculture, specialty crop production, agricultural return flows, internal nutrient cycling (primarily lakes), natural sources, and nonpoint sources. Organic enrichment and low dissolved oxygen impairment in this reach is potentially due to industrial and municipal point sources, agriculture, irrigated crop production, specialty crop production, range grazing, agriculture storm runoff, subsurface drainage, and irrigation tailwater, agriculture animal production, upstream impoundment, flow regulation and modification, and out-of-state sources. Potential sources for temperature impairment in this reach include upstream impoundment, flow regulation and modification, and nonpoint sources.
- Klamath River (Middle Klamath River, Scott River to Trinity River), 1,389 miles: Impaired by nutrients; potential sources include industrial and municipal point sources, agriculture, agriculture storm runoff and irrigation tailwater, wastewater disposal to land, upstream impoundment, natural sources, nonpoint sources, and out-of-state sources. This reach is also impaired by organic enrichment and low dissolved oxygen; potential sources include industrial and municipal point sources, combined sewer overflow, agriculture, agriculture storm runoff and irrigation tailwater, upstream impoundment, flow regulation and modification, and out-of-state sources. Temperature is also impaired in this reach; potential sources include hydromodification, channelization, dam construction, upstream impoundment, flow regulation and modification, water diversions, habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, natural sources, and nonpoint sources.
- Klamath River (Salmon River), 871 miles: Impaired by nutrients; potential sources are unknown nonpoint sources. Temperature also impairs this reach; potential sources include removal of riparian vegetation and unknown nonpoint sources.
- Laguna de Santa Rosa (Middle Russian River), 96 miles: Impaired by low dissolved oxygen; potential sources include internal nutrient cycling (primarily lakes) and nonpoint and point sources.
- Russian River watershed, including Laguna de Santa Rosa, entire watershed: Impaired by sedimentation and siltation; potential sources include road construction, land development, disturbed sites, urban runoff and storm sewers, other urban runoff, highway, road, and bridge runoff, hydromodification, channelization, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, channel erosion, erosion and siltation, erosion from derelict land, highway maintenance and runoff, and nonpoint sources. The watershed is also impaired by temperature; potential sources include hydromodification, upstream impoundment, removal of riparian vegetation, streambank modification and destabilization, and nonpoint sources.
- Lake Pillsbury, 1,973 acres: Impaired by mercury; potential sources are natural.
- Mad River, 654 miles: Impaired by sedimentation and siltation; potential sources include silviculture, resource extraction, and nonpoint sources. The river is also impaired by temperature; potential sources include upstream impoundment, flow regulation and modification, habitat modification, removal of riparian vegetation, nonpoint sources, and

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unknown nonpoint sources. Turbidity also impairs this river; potential sources include silviculture, resource extraction, and nonpoint sources.

- Mattole River, 503 miles: Impaired by sedimentation and siltation; potential sources include specialty crop production, range grazing, silviculture, road construction, hydromodification, habitat modification, removal of riparian vegetation, streambank modification and destabilization, erosion and siltation, and natural sources. Temperature impairment is potentially caused by range grazing, silviculture, road construction, habitat modification, removal of riparian vegetation, natural sources, and nonpoint sources.
- Lake Mendocino, 1,704 acres: Impaired by mercury; potential sources include resource extraction and nonpoint sources.
- Navarro River Delta, 48 acres: Impaired by sedimentation and siltation; potential sources include erosion and siltation.
- Navarro River, 415 miles: Impaired by sedimentation and siltation; potential sources include agriculture, nonirrigated and irrigated crop production, specialty crop production, range grazing, agriculture grazing, silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, silvicultural point sources, construction and development, highway, road, and bridge construction, land development, disturbed sites, resource extraction, flow regulation and modification, water diversions, habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, channel erosion, erosion and siltation and nonpoint sources. Temperature also impairs this reach; potential sources include agriculture, agricultural return flows, resource extraction, flow regulation and modification, water diversions, habitat modification, removal of riparian vegetation, streambank modification and destabilization, drainage and filling of wetlands, and nonpoint sources.
- Noyo River, 144 miles: Impaired by sedimentation and siltation; potential sources include silviculture and nonpoint sources.
- Redwood Creek, 332 miles: Impaired by sedimentation and siltation; potential sources include range grazing, silviculture, harvesting, restoration, and residue management, logging road construction and maintenance, construction and development, disturbed sites, removal of riparian vegetation, streambank modification and destabilization, erosion and siltation, and natural sources. Temperature also impairs this reach; potential sources include logging road construction and maintenance, removal of riparian vegetation, streambank modification and destabilization, erosion and siltation, natural sources, and nonpoint sources.
- Russian River (Lower Russian River Austin Creek), 81 miles: Impaired by sedimentation and siltation; potential sources include silviculture, construction and development, disturbed sites, dam construction, flow regulation and modification, and erosion and siltation. This reach is also impaired for temperature; potential sources include hydromodification, flow regulation and modification, habitat modification, removal of riparian vegetation, and nonpoint sources.

## **Groundwater**

Groundwater development in the North Coast Hydrologic Region occurs along the coast, near the mouths of some of the region's major rivers, on the adjacent narrow marine terraces, or in the inland river valleys and basins. Reliability varies significantly.

Along the coastal valleys, most groundwater comes from shallow wells in sand and gravel aquifers below rivers. Water from Ranney collectors installed in the Klamath River, Rowdy Creek, the Smith River, and the Mad River supplies Klamath, Smith River and Crescent City in Del Norte County and most of the Humboldt Bay area in Humboldt County. Except on the Mad River, which has continuous supply via releases from Ruth Reservoir, this groundwater depends on rain and stream flow throughout the season. In drought years when stream flows are low, seawater can intrude up the river channels causing brackish or saline water to enter the groundwater. This has been a problem in the town of Klamath, which, in 1995, had to take water from a private well.

1        Toward the southern portion of the region, along the Mendocino coast, the town  
2 of Mendocino typifies the problems with shallow marine terrace aquifers. Low aquifer  
3 storage limits groundwater. And surveys done in Mendocino in the mid-80s indicate  
4 about 10 percent of wells go dry every year and up to 40 percent go dry during drought  
5 years.

6        Groundwater development is limited in the inland coastal valleys north of the  
7 divide between the Russian and Eel Rivers. Limitations stem from a lack of alluvial  
8 aquifer storage. Many wells rely on hydrologic connection to the rivers and streams of  
9 the valleys. There are problems. For example, the city of Rio Dell's community wells are  
10 not consistent. So the city recently installed a temporary suction intake in the Eel River,  
11 pending installation of a Ranney well. South of the divide in the Russian River  
12 drainage, a lot of groundwater development has occurred on the Santa Rosa Plain. The  
13 groundwater augments surface water from the Russian River Project.

14  
15        In the Klamath River Basin, the major groundwater basins and sub basins  
16 include the Shasta and Scott River valleys in the Lower Basin, and Butte Valley, Tule  
17 Lake and Lower Klamath Lake in the Upper Basin. Oregon shares the latter two sub  
18 basins.

19        Of these basins, Butte Valley is the most stable. The historical annual  
20 agricultural surface water supply has been about 20,000 acre-feet. From the early  
21 1950s to the early 1990s, farmers brought nearly all arable land in the valley into  
22 production. They used groundwater to farm the additional acres. It has been estimated  
23 that fully developed demands are only 80 percent of the available groundwater.

24        By contrast, water supply issues in the other three basins hinge on fish in the  
25 Klamath River and the Upper Klamath Basin. The federal Endangered Species Act  
26 requires lakes be kept at minimums for two suckerfish species and minimum flows in  
27 streams for Coho salmon and steelhead trout.

28        Since about 1905, the Klamath Project has provided surface water to the  
29 agricultural community, which in turn has provided water to wildlife refuges. Since the  
30 early 1990s, however, water in the Klamath Project has been running low. In 2001  
31 during a severe drought, the USBR delivered about 75,000 acre-feet of water to  
32 agriculture in California, about 25 percent of the normal supply. In the Tule Lake and  
33 Lower Klamath Lake sub basins, this translated to a drought disaster, for both  
34 agriculture and the wildlife refuges.

35        As surface water dwindled, farmers and ranchers went to groundwater. In 1997,  
36 they used about 6,000 acre-feet; by 2001, they were using roughly 60,000 acre-feet.  
37 And due to the uncertainty of the surface water supply additional groundwater  
38 development continued.

39        The Lower Klamath Basin and the Scott River and Shasta Valley sub-basins rely  
40 mostly on surface water diversions. In most years, surface water satisfies most demand  
41 and groundwater is used depending on wet or dry conditions. The in-stream flow  
42 requirements for both salmon and suckerfish presented a surface water supply problem  
43 for agriculture in both sub basins in 2001. Discussions are under way to develop ways  
44 to use both surface and groundwater to meet environmental and agricultural demands.

Groundwater quality characteristics and specific local impairments vary with regional setting within the North Coastal Region. In general, seawater intrusion and nitrates in shallow aquifers are problems in the coastal groundwater basins, high TDS and general alkalinity are problems in the lake sediments of the Modoc Plateau basins, and iron, boron, and manganese can be problems in the in-land basins of Mendocino and Sonoma Counties.

## **Agriculture**

Total irrigated land within the North Coast Region in 1998 was \_\_\_\_\_ acres, \_\_\_\_\_ acres in 2000, and \_\_\_\_\_ acres in 2001. Irrigated agriculture in the North Coast Region uses most of the region's water. Irrigation today accounts for 81.4 percent of the region's water use, while municipal and industrial use is only about 18.6 percent. Neither should increase greatly in the next 30 years

In the northeast portion of the region, nearly three-quarters of the 320,000 acres irrigated in the region are in the Upper Klamath Planning Subarea. The principal crops there are grain, pasture, and alfalfa. Also, there are potatoes, onions, garlic, strawberries, horseradish and mint. Sugar beets in the Tule Lake area are gone because refineries in Hamilton City, Woodland and Tracy have closed. Other crops grow in their place. The highest-value crops in this region are the substantial acres of grapes and orchards in the Russian River Basin and ornamental flowers, including bulbs, in Del Norte County.

In the southwest portion of the region, over the past 30 years non-irrigated deciduous orchards have declined while irrigated acreage and vineyards have grown. These changes have occurred in the sections of Sonoma and Mendocino counties that are partially in the North Coast Hydrologic Area.

In Sonoma County, orchards declined from 20,000 acres in 1971 to fewer than 3,500 in 2001. But irrigation water used on orchards did not decrease in the same proportion because many of the apple, prune and walnut orchards taken out of production were not irrigated. In 1986, of 15,700 acres of deciduous orchards in Sonoma County, more than 10,000 acres were not irrigated. Non-irrigated vineyards were also a common occurrence with over 25 percent of vineyard acreage managed without irrigation in 1986. As the acreage of Sonoma County orchards declined, vineyard acreage increased, rising from approximately 15,000 acres in 1971 to almost 60,000 acres in 2001. New vineyards have been established on land once used for orchards, on hillsides not previously used for agriculture, and by replacing older vineyards damaged by infestations of the root louse phylloxera. Most new vineyards use drip irrigation systems, which enable viticulturists to carefully control soil moisture and produce the very high quality wines for which this region is famous. Vineyards use overhead sprinklers for frost protection in the spring and for post-harvest irrigation in the fall. Within the Russian River Planning Area of the county, the largest clusters of vineyards, about 35,000 acres, are in the Alexander, Russian River and Dry Creek Valleys. There also are vineyards in the hills along the Sonoma County coast.

In Mendocino County, changes in agricultural land and water use in parallel those in Sonoma County. Most of the deciduous orchards are in pears, declining from 7,000

1 acres in 1972 to 3,000 in 2001. During this same period, vineyard acreage increased  
2 9,600 acres to 17,800 acres, again following the pattern of displacing orchards and  
3 expanding onto previously uncultivated land. Within the Coastal Planning Area,  
4 Mendocino County vineyards mainly cluster in the Anderson Valley near Booneville,  
5 with more vineyards north along the coast. In the Russian River Planning Area, most  
6 vineyards are around Ukiah extending north into the Redwood Valley and south to the  
7 Hopland region.

8 Although wine grapes are the predominant crop in Sonoma and Mendocino  
9 counties, there is significant acreage in irrigated pasture. In 2001, these two counties  
10 had more than 15,000 acres of irrigated pastures. The largest areas of pasture are  
11 between Santa Rosa and Sebastopol in Sonoma County and in the Round Valley of  
12 northeastern Mendocino County near Covelo. Reclaimed wastewater irrigates many of  
13 the pastures near Santa Rosa, while pastures in Round Valley use shallow  
14 groundwater.

15 In addition to vineyard and orchard crops, irrigated agriculture in 2001 in the  
16 Sonoma and Mendocino portions of the North Coast Hydrologic Region included  
17 approximately 1,000 acres of irrigated truck crops, 400 acres of grain, 400 acres of field  
18 crops and 200 acres of alfalfa.

19 Even though there is an abundance of irrigable land in the Klamath River basin,  
20 the short growing season and water supply limit its use. Table \_\_\_\_ Total  
21 Evapotranspiration, shows evapotranspiration of applied water and effective  
22 precipitation for 1998, 2000 and 2001. The supply of irrigable land in the region  
23 exceeds the amount of affordable water. And since 1908, agriculture along the Russian  
24 River in Mendocino and Sonoma Counties has depended on diversion from the upper  
25 Eel River watershed into the Russian River watershed beginning at Lake Mendocino.  
26 Table \_\_\_\_, \_\_\_\_ and \_\_\_\_ shows total acreage, ETAW and applied water for five  
27 major crops for 1998, 2002 and 2001. Lack of water is particularly noticeable in the arid  
28 inland portions of the region served by the Klamath Project. The shortages in 1992 and  
29 2001 were caused by prolonged drought and water diverted for endangered fish. The  
30 Coho salmon was listed in the fall of 2002 and will have a dramatic effect on surface  
31 water diverters in Scott and Shasta Valleys, as well as for the Klamath Project. The  
32 decision on the Coho Salmon in 2002 was the 'listing is warranted'.

33 Climate, soils, water supply, and remoteness from markets limit profitable crops  
34 throughout most of the North Coast region. In the inland valley areas, there is more  
35 irrigable land than can be irrigated with existing supplies. The agricultural trend in the  
36 past decade has been one of land consolidation and loss of prime agricultural land to  
37 urban and slow growth. This reflects the low crop values, lower quality agricultural land,  
38 and lack of additional cheap surface water supplies and use of only the most  
39 economically developable groundwater sources.

## 42 **Environment**

43 Through the California Wild and Scenic Rivers Act of 1972, Californians determined  
44 that most water in the North Coast Region would remain in the rivers to preserve their  
45 free-flowing character and provide for environmental uses. Most of the Eel, Klamath,

1 and Smith Rivers are wild and scenic, which protests their free-flowing pristine  
2 character.

3 For 25 years, water has been reallocated back to the Trinity River below Lewiston  
4 Dam to augment flows. This caused a net reduction of about 222,000 acre-feet per  
5 year of water once available to the Sacramento Valley Region. Additional water may be  
6 reallocated to the Trinity, depending on the results of an ongoing 22-year flow  
7 evaluation by U.S. Fish and Wildlife Service. A court had ordered an environmental  
8 impact report completed by mid-April, 2003. However, the amount of water to be  
9 released from the Central Valley Project to the Trinity River could still be in courts.

10 The principal uses of environmental water occur in the Lower Klamath, Tule  
11 Lake, and Clear Lake National Wildlife Refuges and the Butte Valley and Shasta Valley  
12 Wildlife Areas. In Butte Valley, most of the water for wildlife comes from about 3,000  
13 acre-feet of groundwater. Streams, rivers, lakes and reservoirs serve other refuges and  
14 wildlife areas in the region. Crops grown in the refuges are wheat, alfalfa, barley, millet,  
15 and milo. Refuges and wildlife areas are near cropland and they provide abundant feed  
16 and grazing. Wildlife using the refuges are Canada, snow and white fronted geese; and  
17 mallard, pintail, gadwall, teal, canvasback, redhead ducks. There is also pheasant.  
18 Other wildlife species such as songbirds, raptors, shorebirds, antelope, and deer also  
19 depend on the refuges and cropland.

20 Environmental water use in the North Coast Hydrologic Region will probably  
21 remain unchanged. Small population growth and the abundance of water will lead to  
22 stable long-term water use. However, releases from dams for downstream  
23 requirements could change depending on studies of instream flows and anadromous  
24 fisheries.

## 25 26 **Recreation**

27 Vacationers, boaters, anglers, sightseers and others flock to the North Coast  
28 Region. They are attracted by the region's 400 miles of scenic ocean shoreline,  
29 including nearby forests with more than half of California's redwoods. Inland there are  
30 mountains, including 10 wilderness areas run by the U.S. Forest Service. It has more  
31 than 40 state parks, numerous Forest Service campgrounds, the Smith River National  
32 Recreation Area and the Redwood National Park. It is an area of rugged natural beauty  
33 with some of the most renowned fishing in North America. In addition to the natural  
34 attractions, people flock to the region's scores of small reservoirs.

35 During 1990, more than 10.5 million visitors poured in the region's 41 state and  
36 federal parks; and use of national forests and local reservoirs is probably several times  
37 that. In some areas of the region, recreation has surpassed the declining lumber  
38 industry in jobs and economic importance. Based on studies of recreation and  
39 economic development within California, the demand for recreation will keep growing.

40 Despite the importance of recreation to its economy, the region's water use for  
41 recreation is relatively minor. The various recreation destinations have developed their  
42 own small water supplies, including wells, springs and streams.

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## Major water issues of North Coast Hydrologic Region

- The flows of both the Klamath and Trinity Rivers have been heavily reduced by Bureau of Reclamation diversions, and are marked by summer temperatures lethal to salmonids.
- Redwood Creek and the Mad River are highly erosive and filled with sediment, to the point that anadromous species are no longer able to reach spawning grounds, yet have good to fair water quality.
- Massive sediment loads plague the Eel River complex, the largest river system draining to Humboldt County's coast (and third-largest in California), is plagued by massive sediment loads from unstable soils and heavy rains. Water quality decreases downstream. The Eel River is also host to Humboldt County's largest fisheries.
- The Cape Mendocino watershed is highly erosive due to road construction, is drier and more mountainous than other coastal watersheds, and has poor water quality.
- Anadromous fish: Nearly all major waterways are host to anadromous fisheries, particularly Chinook and Coho salmon and cutthroat and steelhead trout, which are adversely affected by water quality and quantity issues.
- Compliance with new EPA drinking water standards: Compliance is a primary issue affecting water managers in this region. Compliance will require at least filtration for most communities and will be very expensive.
- Trinity River Flows: There is continuing controversy over the level of downstream releases needed from the CVP's Trinity River Project. The 22-year flow evaluation study will recommend a permanent flow release schedule. This final recommended release schedule may further reduce CVP yield. The court has ruled there is to be an EIR out in 120 days from mid December 2002.
- Trinity River Sediment Control: High periodic flow releases from Trinity Dam have been proposed as a means of flushing environmentally harmful decomposed-granite sand out of the river. Pond construction has not eliminated the need for high flows. High flows are needed to remove vegetation from the channel to stop siltation. This 70-foot-high, 1,100 acre-foot dam and reservoir project will keep a large portion of the creek-sand sediment from flowing into the Trinity River where it damages spawning and rearing areas. Sediment ponds at the mouth of the creek largely control the portion of sediment that flows in below the dam.
- Other Instream Flow Issues: Similar differences of opinion exist at other locations throughout the region where there is conflict between water supplies for in-basin needs and fishery requirements. Examples include the Klamath River below Iron Gate Dam, the Shasta and Scott Rivers below irrigation diversions, the Upper Eel River below Lake Pillsbury and the lower reaches of the Russian River below Lakes Mendocino and Sonoma.

## Non-point source pollution and fisheries of North Coast Region

- Stream Sedimentation: Changes in the morphology of channels have occurred from increased sedimentation rates; shallower, wider channel form increases insulation (sunlight penetration), decreases low flow velocity, and increases deposition of very fine material. Sedimentation of small streams in the Eel River delta has caused localized flooding and accelerated erosion in some cases from redirected stream channels. Gravel extraction is also a concern. The regulation of gravel extraction is done primarily by the U.S. Army Corps of Engineers and the California Department of Fish and Game.
- Timber Harvest Practices: Logging has decreased the canopy cover over tributaries and the main stem of the river. Lack of canopy cover increases the solar radiation reaching the water and increases water temperature. High water temperatures are detrimental to reproduction of cold-water fish.
- Dairies and Grazing: While the potential effects from livestock uses have not been fully evaluated concern has been raised regarding dairy industry and grazing effects to the watershed from direct discharges of waste and/or whey, animals in the creeks and waterways, trampling of stream banks, and other erosion mechanisms. Dairies should be brought up to Title 27 standards. Grazing issues include erosion and sedimentation, and water chemistry issues.

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- **Herbicide Application:** (See page 33)
- **Interbasin Transfers of Water and Regulated Flows from Dams:** These activities affect sediment, flow, and temperature dynamics and may contribute to the impairment of the beneficial uses. Storm water runoff from all watersheds draining to Humboldt Bay conveys indicators of bacterial contamination that influences shellfish harvest. Seasonal and rainfall based shellfish harvesting closures are in effect to mitigate the effects of nonpoint source runoff. A shellfish Technical Advisory Committee was established in November 1995 to address nonpoint source runoff issues.
- **Fishery Declines:** Fish populations have declined precipitously on all north coast streams since the 1960s. Many people tend to identify dams as the main cause of these fishery declines, yet on streams with no dams, such as the Smith, Van Duzen and Mattole rivers, have also suffered reductions. There are many factors, which contribute to fishery declines in a compounding manner. Some of these are over fishing, soil erosion, disease, introduced non-native fish, ocean conditions, water pollution, climatic conditions (drought), hatchery operations, increase in prey species, decreased instream flows and others. Identifying and correcting the most critical factors is extremely difficult and debatable.
- **Endangered Species:** Two species of suckerfish as well as several stocks of salmonids (Coho, Chinook and steelhead) found in the Klamath Project area have been listed as "endangered" under the federal and State Endangered Species acts. In response, the U.S. Fish and Wildlife Service imposed restrictions on project operations that reduced dry period water supply capabilities. As a result, roughly 7,000 acres of normally irrigated land in California were taken out of production in 1992. The modified operation of the Klamath Project to accommodate the needs of the listed suckers had reduced the flows below Iron Gate dam that are critical to salmon and steelhead survival in the middle and Lower Klamath. By far the major cause of reduced flows below Iron Gate Dam during 1992 was the continuing drought. Most recently (2002), Coho salmon found in the Klamath River drainage area have been listed as "endangered" under the federal and State Endangered Species acts.
- **Klamath River Fishery Issues:** The primary water management issue in the Klamath River Basin is the restoration of fish populations that include listed species such as the Lost River and shortnose suckers, Coho salmon and steelhead trout. The Lost River sucker is native to Upper Klamath Lake and its tributaries, and the shortnose sucker is found in the Lost River, Clear Lake, Tule Lake and Upper Klamath Lake. Both species spawn during spring. Higher water levels in Upper Klamath Lake have been identified as an aid to recovery of these fisheries. Coho and steelhead were recently listed; and water supply implications will not be known until management plans are completed and recovery goals are established. The federal listing and state listing is Threatened for the Klamath River.
- **Lakes Earl and Talawa:** These linked lakes north of Crescent City are being allowed to rise to higher levels than historically permitted to increase wildlife habitat. The level of these lakes is controlled by breaching an ocean-formed sand bar at their common outlet. Local fears that this would interfere with the operation of surrounding septic systems has subsided after a year of higher levels without significant problems. Agreement among agencies on the maximum allowable levels has not been reached, although studies continue. Higher late summer levels in these lakes could increase water availabilities to surrounding shallow wells. (Note: Fish and Game is about to release its management plan for Lake Earl. You might want to run this paragraph by Karen Kovacs at Fish and Game in Eureka.)
- **Safe Drinking Water Act - Humboldt Bay Municipal Water District:** During the early 1990s, the District supplied an average of 62,000 acre-feet per year in the Humboldt Bay area, including Eureka, Arcata, McKinleyville and several pulp and lumber mills. Recently some of the mills have closed or dropped in production. Today, the district supplies an average of \_\_\_\_\_ acre-feet per year. The district's supply from Ruth Reservoir on the Mad River is allocated through existing contracts. The district takes its water from the Mad River and holds title to 75 million gallons per day. It serves 77,000 residents – 59 percent of the county — in three cities and five service districts, including Eureka, Arcata, and McKinleyville. Per capita consumption is 10.9 million gallons in its service area. Eureka has separate rights to 6.5 million gallons per day. The city of Fortuna, the only other water provider serving a major population center in the county, records a per capita consumption of 125 gallons per day and total consumption of 1.1 million gallons per day. Approximately 4 million gallons per day of additional supply is available to meet future demands or alleviate drought conditions. The district considered enlarging Ruth Reservoir, but enlargement does not appear to be feasible and recent changes in health regulations would require expensive additional treatment of water from that source. Complying with the surface water treatment rules established in the 1986 amendment to the Safe Drinking Water Act presents a difficult challenge for the Eureka area. Water from the district's

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Ranney collectors in the Mad River have been defined as groundwater under the influence of surface water and must be filtered. Since the pulp and lumber mills have been reduced, there should be no shortage of water. If pulp mills do go back on line they could use less water to produce pulp. Actually one pulp mill has closed and the other has changed its operation, resulting in a situation where the district now has 24,000 acre-feet of surplus water on the market for sale. Alaska Water Exports is in negotiation with the district to export (tow) the water to southern California via large bladders.

- Russian River Instream Flow Decision and Supply: Water supply problems in the Russian River Basin have become critical in the Ukiah and Hopland Valley areas, resulting in moratoriums for new residential hook-ups in some districts and water shortages in others. In the lower Russian River Basin water supply issues have been resolved to beyond 2010 with water availability from Lake Sonoma and Warm Spring Dam and State Water Resources Control Board Decision 1610 defining instream flow requirements and operating criteria. However, there is growing concern over the extent of sedimentation in Lake Pillsbury and the resulting reductions in dry-year water supplies. Additionally, Mendocino County is concerned that Decision 1610 will prevent the county from obtaining additional water from the Russian River and the Eel River.
- Small Community Water Supply Problems: A number of smaller communities throughout the region have continuing supply problems, often related to the lack of economic base to support development cost. For example, the areas north and south of the town of Trinidad in Humboldt County depend on small springs and shallow wells, which provide an inadequate supply during late summer and fall. These areas have attempted to connect to Trinidad's water supply system supplied from Luffenholtz Creek, but were unsuccessful due to local fears of overtaxing this small system. The only dependable water supplies at this time are Humboldt Bay MWD or desalination.
- Water Supply Capacity in Smith River: The town of Smith River, 13 miles north of Crescent City, takes its water supply from wells along Rowdy Creek. Water demands in the town of Smith River are expected to exceed the capacity of the town's delivery system if projected growth occurs. Growth from Brookings, a popular Oregon retirement and resort community about 7 miles north of the stateline, is affecting Smith River. The Smith River Community Services District recently completed an extensive upgrade to its system. The CSD added additional water storage (tanks) and upgraded its pumping capacity. The District is now upgrading and replacing lines on a case by case basis. They are delivering about half of their design capacity. Source Sparky Countess former Board member of SRCSD.
- Water Conveyance Capacity in Crescent City: Growth in the Crescent City area is creating the need to expand the city's water distribution system, which consists of a Ranney collector well on the Smith River and a 50,000 gallon storage tank. The Ranney collector can produce about 7,800 acre-feet per year, but the capacity of the existing transmission and storage system is only about 4,500 acre-feet per year. Crescent City is planning to add new mains, a new pump station, one additional booster pump and a 4 mg storage tank. The upgraded system will produce 5,900 acre-feet per year. The estimated cost is \$6.7 million. A second phase will make additional distribution system improvements. These new conveyance facilities should meet the city's demands through 2007. If this is case, this is only a short-term fix. Crescent City recently completed the above improvements. Their and our community's biggest problem now is that the WWTP has reached its design capacity. The city, county and a local tribe (Elk Valley Rancheria) are in the second year of a seven-year plan to design and build a new WWTP.
- Water Quality in Willits: The city of Willits has had chronic water quality problems with turbidity, taste and odor with water from Morris Reservoir and high arsenic, iron, and manganese levels in its well supply.
- Water Supply in Fort Bragg: The city of Fort Bragg has shortage problems with its individual wells and has hired a consultant to investigate alternative solutions. A possible solution is an offshore storage project.
- Water Supply in Rio Dell: The city of Rio Dell experienced a drought related water shortage in April 2001. A meeting of DWR staff, the Office of Emergency Services, and the city of Rio Dell was held on April 17, 2001. A proposal to remedy the shortage and the status of the Eel River water right application were discussed. Fear of potential well contamination, together with a dwindling groundwater supply at the city well site north of the Eel River, brought about an effort to acquire water from the river to replace the city groundwater supply. Pending a permanent supply system a temporary pumping and filtering system was proposed, including moving the present diversion point on the river near the well field to the old highway bridge where rock protection provides a secure inlet. Distribution system, fire protection, and sewer system issues will be handled later with non-emergency funding. To establish the usability of the water distribution system on an emergency basis the Department assisted the public works staff in mapping the leaks in the

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water system while the emergency installation was prepared. The fifty-one suspected leaks found during the mapping are probably a fraction of the system's leaks.

- Seawater Intrusion in Klamath: The town of Klamath in Del Norte County obtains its water supply from two wells adjacent to the Klamath River. During the recent drought, seawater intrusion forced the Klamath Community Services District to use an upstream private well in the Hoopa Creek drainage area. All of Klamath's water supply in 1995 was obtained from the private well, and no water was pumped from Klamath CSD's wells. In 1996, Klamath CSD pumped adequate supplies from its two wells; but seawater intrusion during dry years remains a problem. Although the Hoppaw Creek drainage area has adequate groundwater supplies, Klamath CSD does not have funding to construct an additional well. Many north coast wells located on low terraces near the ocean are vulnerable to seawater intrusion if over pumped.
- Water Supply in Mendocino: Groundwater use is constrained by limitation in aquifer storage capacity in some coastal communities. Wells on low terraces near the ocean are potentially vulnerable to seawater intrusion. The town of Mendocino is completely dependent on individual wells. A local survey, conducted in 1986, showed that about 10 percent of the wells go dry every year and 40 percent go dry during drought years. In 1986, water was trucked in during summer and fall to help reduce shortages.
- The Redwood Valley County Water District just north of Ukiah in Mendocino County recently received notice that their sole source of water (surplus) from the Russian River Flood Control and Water Conservation District is no longer available. The District's allocation from Lake Mendocino is totally committed. Accordingly, a community of 6,200 residents, 20 businesses, 3 schools, 200 agricultural customers and a Fire District are on the verge of having no water.
- In an April 2002 report prepared by the state Department of Health Services, Drinking Water Field Operations Branch, on Drinking Water Adequacy Assessment, it was stated that the entire Russian River and its tributaries have been fully appropriated for summertime uses. Only new water rights are considered by the SWRCB for the diversion of winter/spring flood flows for off-stream storage.
- The Eel River, Humboldt Bay, Trinity River, and Klamath River Watershed Management Areas all list groundwater contamination as a primary water quality issue.
- Potential ground water contamination, such as nutrient loading via ground water to streams, is of concern. Pesticide and herbicide applications (see page 27) on private and public lands are also of concern. Use of pesticides and herbicides along roadways, in agricultural operations, in urban areas, and in lily bulb farming and forestlands in Watershed Management Areas poses a threat to ground and surface waters. There are also a number of lumber mills (such as the Burnt Ranch Mill) that have a history of using wood preservatives including pentachlorophenol that may be the source of soil and groundwater contamination. See also the section on underground storage tanks and leaking underground fuel tanks in Chapter 12: Fire and Other Hazards. (This reference is not a typical DWR Bulletin inclusion.)
- To protect water resources within a watershed context, a mix of point and nonpoint source discharges, ground and surface water interactions, and water quality/water quantity relationships must be considered. These complex relationships present considerable challenges to water resource protection programs. The state and Regional Boards are responding to these challenges with the Watershed Management Initiative (WMI). The WMI is designed to integrate various surface and ground water regulatory programs while promoting cooperation within watersheds. It is also designed to focus limited resources on key issues.

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### **Examples of ecosystem restoration projects in region**

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- Russian River Environmental Restoration Actions: Water quality issues and barriers to fish migration are of concern in the Russian River Basin. A Russian River Action Plan, prepared by Sonoma County Water Agency in 1997, provides a regional assessment of needs in the watershed and identifies fishery habitat restoration projects in need of funding. The SWRCB is promoting a coordinated Russian River fishery restoration plan. In 1997, NMFS listed steelhead trout as threatened and 2002 listed Coho salmon as endangered along part of the Central California coast that includes the Russian River Basin. SCWA, USACE, and NMFS signed an agreement to establish a framework for consultation under Section 7 of the Endangered Species Act. Under the agreement USACE and SCWA will jointly review information on their respective Russian River activities to determine effects to

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critical habitat. The Eel-Russian River Commission, composed of county supervisors from Humboldt, Mendocino, and Sonoma Counties (Lake County just left the Commission), provides a regional forum for agencies and groups to stay informed about projects and issues affecting the Eel and Russian Rivers. The Commission, formed in 1978 under a joint powers agreement among the counties, was to aid in implementing an Eel-Russian River watershed conservation and development plan. A regional issue now being addressed by the commission is the review of a draft 10-year fishery study by PG&E for its Potter Valley Project, required as a condition of a 1983 FERC license.

- Santa Rosa: A proposed SCWA project would allow fish passage through a flood control structure on Matanzas Creek in downtown Santa Rosa. The original structure, constructed in the early 1960s did not permit fish passage. SCWA installed a fish ladder at Healdsburg Dam on the Russian River, a small flashboard dam used in the summer to create a recreational pool.
- Trinity River Fish and Wildlife Management Program: Following completion of the Trinity River Division, fish populations in the Trinity River Basin declined dramatically. The Resources Agency established a statewide task force in 1967 to develop a program to improve the fishery. One of the most significant problems identified was sedimentation from Grass Valley creek. In 1980, PL 96-335 authorized construction of Buckhorn Mountain Debris Dam on Grass Valley Creek. In 1984, PL 98-541 authorized the Trinity River fish and wildlife management program, providing \$57 million (excluding Buckhorn mountain debris Dam and sediment dredging costs) to implement actions to restore fish and wildlife populations in the Trinity River Basin to pre-project levels. Congress authorized an additional \$15 million in 1993 for purchase of 17,000 acres of the Grass Valley Creek watershed and its restoration. PL 104-143 in 1996 extended the program three years to October 1, 1998, to allow expenditure of funds previously authorized, but not yet appropriated. Reauthorization of the program is now under consideration. A draft EIS/EIR is being prepared to address proposed streamflow changes and mainstem Trinity River restoration actions.
- Widow White Creek Project 2001 – 2002: A grant application co-sponsored by the Redwood Community Action Agency (RCAA) –Natural Resources Services Division (NRS) and the McKinleyville Community Service District (MCSD) was submitted to the California Department of Water Resources (DWR) for funding from the Urban Stream Restoration Program (USRP) for the Widow White Creek Project (DWR). The project components included a bank stabilization project to protect part of the California Coastal Trail (the Hammond Trail), Widow White Creek Interpretative Loop), fisheries restoration, riparian vegetation enhancement, a hydrologic assessment, development of an outdoor education curriculum and construction of a trail loop and stream crossing for easier access to the outdoor classroom, and an easement along the creek donated to the MCSD by a local developer. Funding was approved and \$141,490 was awarded in December 2001. The DWR grant for \$141,490 was the largest share of project funding and was the first to make money available. This provided the crucial funding that enabled RCAA – NRS to raise the additional \$87,960 to complete the project. The initial cost of the project was \$141,490. The final cost not including cost shares was \$229,450. Cost share was provided as volunteer labor and cash donations. Additional cost share was provided by local companies and the landowner for labor, equipment, materials and easement. Altogether donations of easements, labor and materials were worth approximately \$82,000. In summary RCAA and NRS joined with DWR, MCSD, Humboldt County, the Coastal Conservancy, The National Oceanic and Atmospheric Association (the community-based Restoration Program), California Department of Fish and Game, National Marine Fisheries Service, Army Corps of Engineers, two consulting firms, three independent contractors, the landowners, high school students and teachers and community volunteers were able as a group to accomplish the project goals.
- City of Arcata, Humboldt County: The city of Arcata has robust programs for achieving the dual goals of flood control and habitat enhancement. The city is committed to restoring the natural functioning of urban streams and wetlands. There are numerous city plans that direct the city to pursue the acquisition of conservation easements, deeds to wetland and other land for the re-establishment of a natural flood plain for storm water management and flood control and the restoration of fish and wildlife habitat on Arcata's five urban streams. Within the last ten years, the city has expended millions of dollars towards these ends. Along with city funding there are grants from the California Department of Water Resources, the California Department of Fish and Game, the Wildlife Conservation Board, and the U. S. Fish and Wildlife Service. The city has also collaborated with other government agencies, non-profit organizations, community groups and schools.

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## Examples of municipal, industrial water projects in the region

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- City of Santa Rosa Long-Term Wastewater Project: In early 1998 the city of Santa Rosa selected an alternative that would recharge depleted geothermal fields in the Geysers area with treated wastewater as part of its long-term wastewater-recycling program. Under this alternative, the Santa Rosa Subregional Sewage System will pump about 11 million gallons per day of treated wastewater to the Geysers for injection into the steam fields. This amount is a little less than half the flow the treatment system is expected to produce at build out. The project is intended to eliminate weather related problems of the city's disposal system and minimize treated wastewater discharges into the Russian River. The project consists of pipeline transmission and distribution systems and is scheduled to be completed by 2001.
- The city of Fort Bragg experienced water shortages during drought years. The water sources for the city are direct diversions from surface water sources. During average rainfall years, water rights from these sources are enough to meet the city's demands to 2020. Supplies are inadequate to meet the city's needs during drought years and to maintain instream flows required by DFG. DHS issued an order in 1991 prohibiting new demands on the water system until adequate water supplies were developed. The city has been investigating alternative sources of supply and has implemented water conservation measures and improved existing system capacity. As a result of these corrective measures DHS lifted its order in 1993 and allowed the city to begin issuing building permits, subject to restrictions including no net increase in consumption and implementation of a conservation and retrofit program.

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## Example of agricultural water projects in the region

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- SCWA Water Supply and Transmission Project: Sonoma County WA is preparing an EIR to develop additional water supply as well as to expand its existing water transmission system. The project will be implemented under an agreement among SCWA and its water contractors. Components of the project include water conservation, increased use of the Russian River Project, and expansion and revised operation of the water transmission system. Water conservation is planned to provide additional saving of 6,600 acre-feet. The Russian River part will allow for increasing diversions from 75,000 to 101,000 acre-feet from the Russian River. This increase use of the Russian River Project water will require construction of additional diversion and conveyance facilities, including new diversion locations. The project will continue to meet existing instream flow requirements associated with the SWRCB's decision 1610 and will require new water rights applications to SWRCB. The transmission system component has two elements – facilities to divert and treat Russian River Project water and transmission system improvements allowing for delivery of up to 167,000 acre-feet per year. The final EIR was scheduled for late 1998.

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## Water supply and demand outlook in the region

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- Klamath River Fishery Issues: To address the need for greater certainty in project operations, USBR began preparing a long-term Klamath Project operations plan in 1995. Difficult and complex issues have delayed completion of the long-term plan. USBR has issued an annual operations plan each year since 1995 as it continues the development of long-term plan. The Klamath River Compact Commission is facilitating discussions on water management of interstate water resources and to promote intergovernmental cooperation on water allocations issues. Members include a representative from Department, the Director of the Oregon Water Resources Department, and a presidential appointee.
- The Weaverville Community Services District in Trinity County serves about 1,370 metered connections. In average water years, demands within the district are met with existing supplies from East and West Weaver Creeks. During drought years, water rationing and building moratoria were needed to reduce demands. In response to drought year demands, a new diversion of up to three cubic feet per second from Trinity River was constructed. The Weaverville area is expected to have adequate water supplies to meet demands over the next 30 years.

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- Trinity County Water Works District #1 is investigating a wastewater treatment and reuse project for the Hayfork area. The project would treat wastewater from individual septic systems, and would eliminate septic tank seepage into local streams. The district's feasibility study identified a gravity collection system with an oxidation pond and two marsh areas as the best alternative for wastewater treatment. The project would treat 16 acre-feet annually, and could reuse the treated water to irrigate agricultural lands or landscaping. The estimated cost for this project is \$8.9 million.
- The Mendocino Community Services District investigated new water supply sources, including wells in the Big River aquifer and desalting. To date, no acceptable water source has been identified. In 1990, town residents approved developing a public water system if an adequate water source could be found. The district is collecting hydrogeological data on the groundwater basin.
- Humboldt Bay Municipal Water District: Water from HBMWD's Ranney collectors in the Mad River has been defined as groundwater under the influence of surface water and must be filtered. A regional filtration plant is estimated to cost \$16 million. Accordingly, HBMWD is considering the feasibility of developing groundwater to replace a portion of the Mad River supply and to provide for needed future supplies. In the early 1990s, about 45 MGD of the District's 56 MGD average water use was supplied to the Eureka pulp mills for industrial purposes. This water did not require treatment. Today, if the district turns to the supply that recently was dedicated to the mills, this reallocation of HBMWD supplies will have to be treated, if applied to domestic use.
- Russian River Instream Flow Decision and Supply: Through the Eel-Russian River Commission, the two counties are exploring possibilities for maintaining or augmenting available water supplies, including construction of additional storage on the upper Eel River and conjunctive use of groundwater with existing surface supplies.

### **Options for dry-year augmentation**

There is no economically or environmentally feasible solution to significantly augment dry-year irrigation supplies in the North Coast Region. Areas irrigated with surface water will likely continue to make-do with water available from existing facilities. (Incorporate the well construction at Tule Lake) A few additional wells are expected to augment irrigation supplies in the Butte Valley -Tule Lake area. Pressure for additional groundwater development in areas like Scott and Shasta valleys will be greater since the 2002 listing of the Coho salmon. There will also be stricter applications of state Department of Fish and Game regulations that will reduce water from water developments or natural runoff. Today's water supplies and modest expansion of local water sources will generally be adequate to meet the region's expected metropolitan and industrial demands over the next 30 years.

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### **Examples of water needs of localities in North Coast Region**

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- The Humboldt Bay-McKinleyville area will continue to be adequately served by Ruth Reservoir on the Mad River.
- The Humboldt Bay Municipal Water District system may ultimately expand to serve the Trinidad-Moonstone area which is experiencing local water deficiencies. The HBMWD draws water from the Mad River through Ranney collector wells, which are being undercut by erosion of streambed gravel. This problem is being investigated by the district and will be solved in the near future.

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- The Eureka-Arcata area may build a regional \$16 million surface water treatment plant and is investigating groundwater development as an alternative source that would not require treatment.
- Crescent City has as adequate supply from the Smith River but needs more conveyance and storage capacity. It may also build an expensive surface water treatment plant.
- The city of Rio Dell may build an expensive surface water treatment plant. Ranney wells will be put into the Eel River and will be the new supply for Rio Dell.
- Trinity County Waterworks District No. 1 serves the town of Hayfork from the 800-acre-foot Ewing Reservoir and has plans to expand its surface water system. Population growth has almost reached the design capacity of its system, and the district plans to enlarge its offstream reservoir in the next few years. (Check to see if improvement has occurred) This expansion was planned at the time the project was built in the late 1960s.

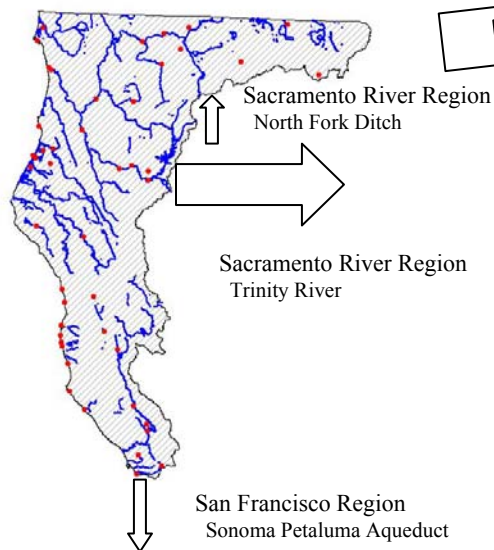
**How the state can help region**

Northern California counties lack the resources for regional or local plans. With continued budget constraints and limited resources, requests for more detailed information, necessary for resolving county, regional and state water issues and concerns, will more than likely increase. The state should be able to provide local governments the needed data and analysis.

The Department of Water Resources is one of many state agencies collecting water information and evaluating various hydrologic areas. Establishing the DWR as the lead agency would allow it to monitor the uniformity of GIS layers incorporated in the County/Regional Inventory and Assessment. The Department would coordinate with each group and agency within each county. This would allow all assessments to be included in the county/regional inventory. Issues and concerns for specific areas could be documented and referenced on GIS layers. Complete land and water use inventories with hydrologic systems would be the foundation of the County/Regional Inventory and Assessments. By identifying the issues/concerns and resources by county within each region, local or regional decisions could be made with the confidence that the best available data was used to make sound judgments on water use, the environment and land use for the people of California.

## NORTH COAST HYDROLOGIC REGION

Draft



### Some Statistics

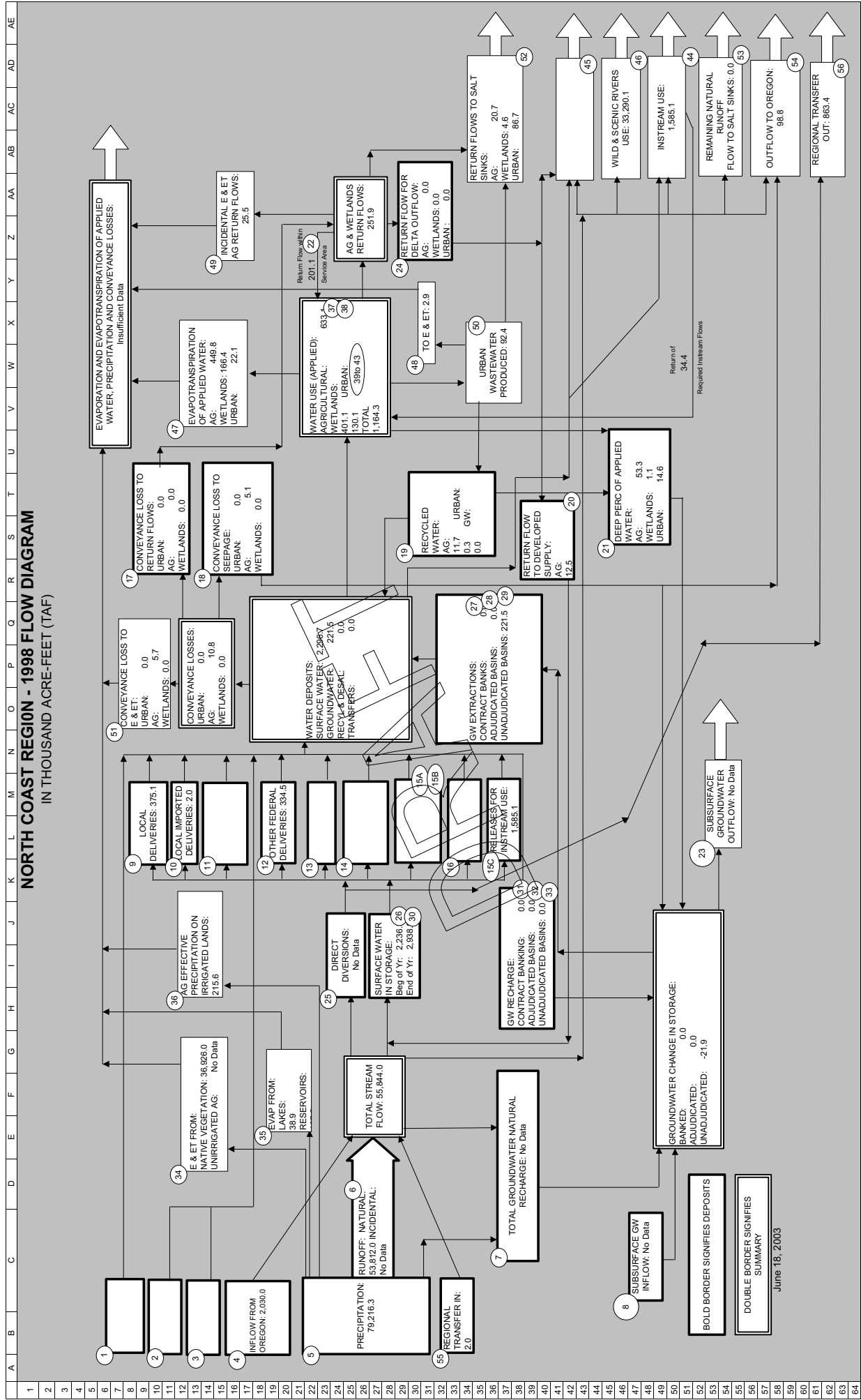
- 19,476 square miles (12.3 % of State)
- 49 inches average annual precipitation
- 644,000 year 2000 population
- 3,780 TAF total reservoir storage capacity
- 291,800 acres irrigated agriculture (1995)

## WATER BALANCE SUMMARY - TAF

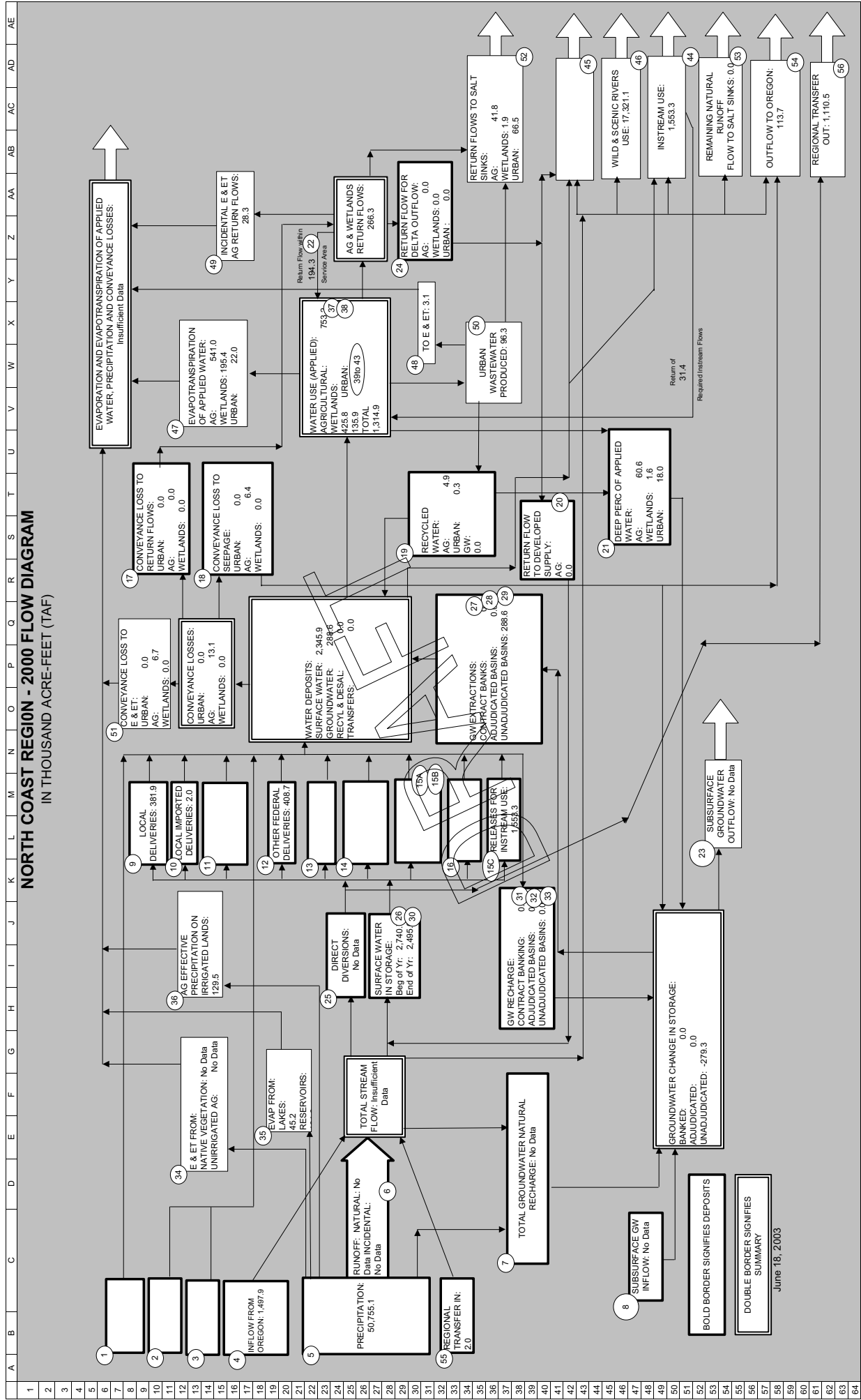
(See Volume 2 for Details)	1998	2000	2001
<b>Accretions to Region</b>			
Precipitation	79,216	50,755	---
Inflow from Oregon	2,030	1,498	---
Surface Water Storage Withdrawals	---	246	---
Groundwater Withdrawals	22	328	---
Imports	2	2	---
<b>Total</b>	<b>81,270</b>	<b>52,829</b>	---
<b>Depletions</b>			
Consumptive Use* (Ag., M&I, Environmental)	638	778	---
Net Surface Water to Storage	703	---	---
Net Groundwater to Storage	---	---	---
Exports to Other Regions	863	1,111	---
Outflow to Oregon	99	114	---
Required Outflow to Ocean	34,875	18,764	---
Additional Ocean Outflow	112	127	---
Losses **	43,980	49,935	---
<b>Total</b>	<b>81,270</b>	<b>52,829</b>	---
<b>Applied Water*</b> (compare w/Consumptive Use)	1,164	1,321	---

\* Note: Consumptive use is the amount of water used and no longer available as a source of supply. Considering water return flows, reuse, etc., applied water is greater than consumptive use.

\*\* Losses include evaporation and evapotranspiration of native vegetation, groundwater subsurface outflows, natural and incidental runoff, and other water outflows that currently are not measured.



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DEDICATED WATER SUPPLY - WATER USE BALANCES  
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WATER USE - TAF	1998			2000			2001		
	Applied Water	Net Water	Depletion	Applied Water	Net Water	Depletion	Applied Water	Net Water	Depletion
<b>Urban</b>									
Urban Large Landscape	5.1			4.9			0.0		
Urban Commercial Use	23.2			24.1			0.0		
Urban Industrial Use	28.2			29.5			0.0		
Urban Energy Production	0.0			0.0			0.0		
Urban Residential Use - Interior	53.3			58.0			0.0		
Urban Residential Use - Exterior	20.3			19.4			0.0		
ETAW		22.1	22.1		22.0	22.0		0.0	0.0
Irrecoverable Losses		2.9	2.9		3.1	3.1		0.0	0.0
Outflow		86.7	86.7		66.5	66.5		0.0	0.0
CL Applied Water	0.0			0.0			0.0		
CL Evap		0.0	0.0		0.0	0.0		0.0	0.0
CL Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
CL Outflow		0.0	0.0		0.0	0.0		0.0	0.0
GW Recharge AW	0.0			0.0			0.0		
GW Recharge E+ET		0.0	0.0		0.0	0.0		0.0	0.0
<b>Total Urban</b>	<b>130.1</b>	<b>111.7</b>	<b>111.7</b>	<b>135.9</b>	<b>91.6</b>	<b>91.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Agriculture</b>									
Applied Water	633.1			753.2			0.0		
ETAW		449.8	449.8		541.0	541.0		0.0	0.0
Irrecoverable Losses		25.5	25.5		28.3	28.3		0.0	0.0
Outflow		69.6	57.1		97.6	97.6		0.0	0.0
CL Applied Water	22.6			27.3			0.0		
CL Evap		5.7	5.7		6.7	6.7		0.0	0.0
CL Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
CL Outflow		2.0	2.0		2.0	2.0		0.0	0.0
GW Recharge AW	0.0			0.0			0.0		
GW Recharge E+ET		0.0	0.0		0.0	0.0		0.0	0.0
<b>Total Agriculture</b>	<b>655.7</b>	<b>552.6</b>	<b>540.1</b>	<b>780.5</b>	<b>675.6</b>	<b>675.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Environmental</b>									
<b>Instream</b>									
Applied Water	1,585.1			1,553.3			0.0		
Outflow		1,550.7	1,550.7		1,521.9	1,521.9		0.0	0.0
<b>Total</b>	<b>1,585.1</b>	<b>1,550.7</b>	<b>1,550.7</b>	<b>1,553.3</b>	<b>1,521.9</b>	<b>1,521.9</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Wild &amp; Scenic</b>									
Applied Water	33,290.1			17,321.1			0.0		
Outflow		33,290.1	33,290.1		17,321.1	17,321.1		0.0	0.0
<b>Total</b>	<b>33,290.1</b>	<b>33,290.1</b>	<b>33,290.1</b>	<b>17,321.1</b>	<b>17,321.1</b>	<b>17,321.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Refuge</b>									
Applied Water	401.1			425.8			0.0		
ETAW		166.4	166.4		195.4	195.4		0.0	0.0
Irrecoverable Losses		0.4	0.4		0.4	0.4		0.0	0.0
Outflow		67.0	67.0		59.8	59.8		0.0	0.0
CL Applied Water	0.0			0.0			0.0		
CL Evap		0.0	0.0		0.0	0.0		0.0	0.0
CL Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
CL Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Sub Total:	401.1	233.8	233.8	425.8	255.6	255.6	0.0	0.0	0.0
<b>Total Environmental</b>	<b>35,276.3</b>	<b>35,074.6</b>	<b>35,074.6</b>	<b>19,300.2</b>	<b>19,098.6</b>	<b>19,098.6</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>TOTAL USE</b>	<b>36,062.1</b>	<b>35,738.9</b>	<b>35,726.4</b>	<b>20,216.6</b>	<b>19,865.8</b>	<b>19,865.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>SUPPLIES - TAF</b>									
Local Deliveries	375.1	375.1	368.5	381.9	381.9	381.9	0.0	0.0	0.0
Local Imported Deliveries	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0
Net Groundwater	142.7	142.7	142.7	196.2	196.2	196.2	0.0	0.0	0.0
GW Recharge	0.0			0.0			0.0		
Reuse Groundwater	78.8			92.4			0.0		
Reuse Surface Water	244.4			258.4			0.0		
Recycled Water	12.0	12.0	12.0	5.2	5.2	5.2	0.0	0.0	0.0
Colorado River Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Base and Project Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Federal Deliveries	334.5	334.5	328.6	408.7	408.7	408.7	0.0	0.0	0.0
SWP Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reqd Env Instream Flow	34,872.6	34,872.6	34,872.6	18,871.8	18,871.8	18,871.8	0.0	0.0	0.0
<b>TOTAL SUPPLIES</b>	<b>36,062.1</b>	<b>35,738.9</b>	<b>35,726.4</b>	<b>20,216.6</b>	<b>19,865.8</b>	<b>19,865.8</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<i>Balance = Use - Supplies</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>

Category Inputs:		Description	North Coast 1998 (TAF)			North Coast 2000 (TAF)			
			Water Portfolio	Applied Water	Net Water	Depletion	Water Portfolio	Applied Water	Net Water
1		Colorado River Deliveries		-			-		
2		Ocean Desalination		-			-		
3		Water from Refineries		-			-		
4a		Inflow From Oregon		2,030.0			1,497.9		
b		Inflow From Mexico		-			-		
5		Precipitation	79,216.3			50,755.1			
6a		Runoff - Natural	53,812.0			N/A			
b		Runoff - Incidental	N/A			N/A			
7		Total Groundwater Natural Recharge	N/A			N/A			
8		Groundwater Subsurface Inflow	N/A			N/A			
9		Local Deliveries		375.1			381.9		
10		Local Imported Deliveries		2.0			2.0		
11a		CVP Deliveries - Base		-			-		
b		CVP Deliveries - Project		-			-		
12		Other Federal Deliveries		334.5			408.7		
13		SWP Deliveries		-			-		
14a		Water Transfers - Regional		-			-		
b		Water Transfers - Imported		-			-		
15a		Releases for Delta Outflow - CVP		-			-		
b		Releases for Delta Outflow - SWP		-			-		
c		Releases for Instream Use		1,585.1			1,553.3		
16		Environmental Water Account Releases		N/A			N/A		
17a		Conveyance Loss to Return Flows - Urban		-			-		
b		Conveyance Loss to Return Flows - Ag		-			-		
c		Conveyance Loss to Return Flows - Wetlands		-			-		
18a		Conveyance Loss to Seepage - Urban		-			-		
b		Conveyance Loss to Seepage - Ag		5.1			6.4		
c		Conveyance Loss to Seepage - Wetlands		-			-		
19a		Recycled Water - Agriculture		11.7			4.9		
b		Recycled Water - Urban		0.3			0.3		
c		Recycled Water - Groundwater		-			-		
20a		Return Flow to Developed Supply - Ag		12.5			-		
b		Return Flow to Developed Supply - Wetlands		-			-		
21a		Deep Percolation of Applied Water - Ag		53.3			60.6		
b		Deep Percolation of Applied Water - Wetlands		1.1			1.6		
c		Deep Percolation of Applied Water - Urban		14.6			18.0		
22a		Return Flow within Service Area - Ag		34.9			25.7		
b		Return Flow within Service Area - Wetlands		166.2			168.6		
24a		Return Flow for Delta Outflow - Ag		-			-		
b		Return Flow for Delta Outflow - Wetlands		-			-		
c		Return Flow for Delta Outflow - Urban		-			-		
25		Direct Diversions	N/A			N/A			
26		Surface Water in Storage - Beg of Yr	2,236.3			2,740.7			
27		Groundwater Extractions - Banked	-			-			
28		Groundwater Extractions - Adjudicated	-			-			
29		Groundwater Extractions - Unadjudicated	221.5			288.6			
Withdrawals:									
23		Groundwater Subsurface Outflow	N/A			N/A			
30		Surface Water Storage - End of Yr	2,938.8			2,495.0			
31		Groundwater Recharge-Contract Banking		-					

Category	Description	North Coast 1998 (TAF)			North Coast 2000 (TAF)		
		Water Portfolio	Applied Water	Net Water	Water Portfolio	Applied Water	Net Water
Inputs:							
32	Groundwater Recharge-Adjudicated Basins		-			-	
33	Groundwater Recharge-Unadjudicated Basins		-			-	
34a	E & ET from Native Vegetation			36,926.0			N/A
b	E & ET from Unirrigated Ag						N/A
35a	Evap from Lakes			38.9			45.2
b	Evap from Reservoirs			167.5			181.3
36	Ag Effective Precipitation on Irrigated Lands		215.6			129.5	
37	Agricultural Water Use		633.1	544.9		753.2	666.9
38	Managed Wetlands Water Use		401.1	233.8		425.8	255.6
39a	Urban Residential Use - Single Family - Interior		42.5			46.0	
b	Urban Residential Use - Single Family - Exterior		17.4			16.4	
c	Urban Residential Use - Multi-family - Interior		10.8			12.0	
d	Urban Residential Use - Multi-family - Exterior		2.9			3.0	
40	Urban Commercial Use		23.2			24.1	
41	Urban Industrial Use		28.2			29.6	
42	Urban Large Landscape		5.1			4.9	
43	Urban Energy Production		-			-	
44	Instream Flow Requirements		1,585.1	1,550.7		1,553.3	1,521.9
45	Required Delta Outflow		-	-		-	-
46	Wild & Scenic Rivers Use		33,290.1	33,290.1		17,324.1	17,321.1
47a	ETAW - Ag			449.8			541.0
b	ETAW - Wetlands			166.4			195.4
c	ETAW - Urban			22.1			22.0
48	E & ET from Urban Wastewater			2.9			3.1
49	Incidental E & ET Ag Return Flows			25.5			28.3
50	Urban Waste Water Produced	92.4			96.3		
51a	Conveyance Loss to E and ET - Urban			-			-
b	Conveyance Loss to E and ET - Ag			5.7			6.7
c	Conveyance Loss to E and ET - Wetlands			-			-
d	Conveyance Loss to Mexico			-			-
52a	Return Flows to Salt Sink - Ag			20.7			41.8
b	Return Flows to Salt Sink - Urban			86.7			66.5
c	Return Flows to Salt Sink - Wetlands			4.6			1.9
53	Remaining Natural Runoff - Flows to Salt Sink			34,840.8			18,843.0
54a	Outflow to Nevada			-			-
b	Outflow to Oregon			98.8			113.7
c	Outflow to Mexico			-			-
55	Regional Imports	2.0			2.0		
56	Regional Exports	863.4			1,110.5		
59	Groundwater Net Change in Storage	-21.9			9.3		
60	Surface Water Net Change in Storage	702.5			-245.7		
61	Surface Water Total Available Storage	3,779.9			3,779.9		

Colored spaces are where data belongs.

N/A

- Data Not Available

"-"

- Data Not Applicable

"0"

- Null value